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No-tillage soybean production in Iowa

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During the 2005 growing season 63 million acres in the United States were planted using no-tillage production practices. Total soybean acres in Iowa in 2007 were 9.4 million and it is estimated that only about 30% of those acres were planted using no-tillage practices.

No-tillage has been used since ancient times by indigenous cultures and is defined as planting of crops in previously unprepared soil by opening a narrow slot, trench or band only of sufficient width and depth to obtain proper seed coverage. Until the early 1970s, tillage for corn and soybean production was mostly related to managing weeds and for seedbed preparation. Introduction of new herbicides and improved tillage and planting equipment resulted in a shift toward reduced tillage systems throughout the 1980s and 1990s. These systems require fewer, more timely passes through the field and left more crop residue on the soil surface, thus conserving fuel and reducing the potential for soil erosion. Recent environmental concerns have expanded beyond soil erosion to controlling loss of nutrients and pesticides.

The adoption rate of no-tillage practices in the northern Corn Belt has been slow compared to other parts of the World. Lack of site specific knowledge of the no-tillage system has most likely been the main limitation to use in corn and soybean production. That has contributed to grower dissatisfaction mainly because of the difficulties in dealing with residue after the previous corn crop. These conditions not only result in slower emergence and growth until R2, but also may affect the stand because of poor planter performance when planting into large amounts of residue. Equipment manufacturers, however, have addressed this problem by developing new residue attachments.

The adoption rate will increase in the future because of the high energy cost and the potential that farmers can sell their carbon credits from carbon sequestration to companies and even countries. No agronomic recommendations exist in Iowa for the growers that want to adopt no-tillage soybean production. A large project was funded through NCSRP from 1994-1996 across the region but nothing was published out of the Iowa data set. Many studies have been conducted since then in Iowa and neighboring states looking at tillage comparison. Despite this, no recommendation exists on how to work within the no-tillage system, minimize the risk with a no-tillage system compared to a tilled system, and how it deviates from current recommendations. For that reason a large project funded by the checkoff and the Iowa Soybean Association was initiated at 6 locations across Iowa (Figure 1).

The project will be conducted from 2007-2009. The overall goal of this research project is to develop management recommendations when producing soybean under no-tillage conditions under various soil types in Iowa.

The specific objectives are to:

1. Determine soybean growth, development and yield potential in a no-tillage production system
2. Determine optimum recommendations for soybean in a no-tillage production system (planting date, plant population, seed treatment, inoculants, row spacing) across Iowa
3. Evaluate the importance of variety selection related to soil-borne pathogens (SCN, SDS, Phytophthora resistance in a no-tillage production system, but also varieties like low-linolenic varieties)
4. Determine the economic advantages or disadvantages using no-tillage production practices across Iowa
5. Increase awareness in Iowa on the use of no-tillage production practices

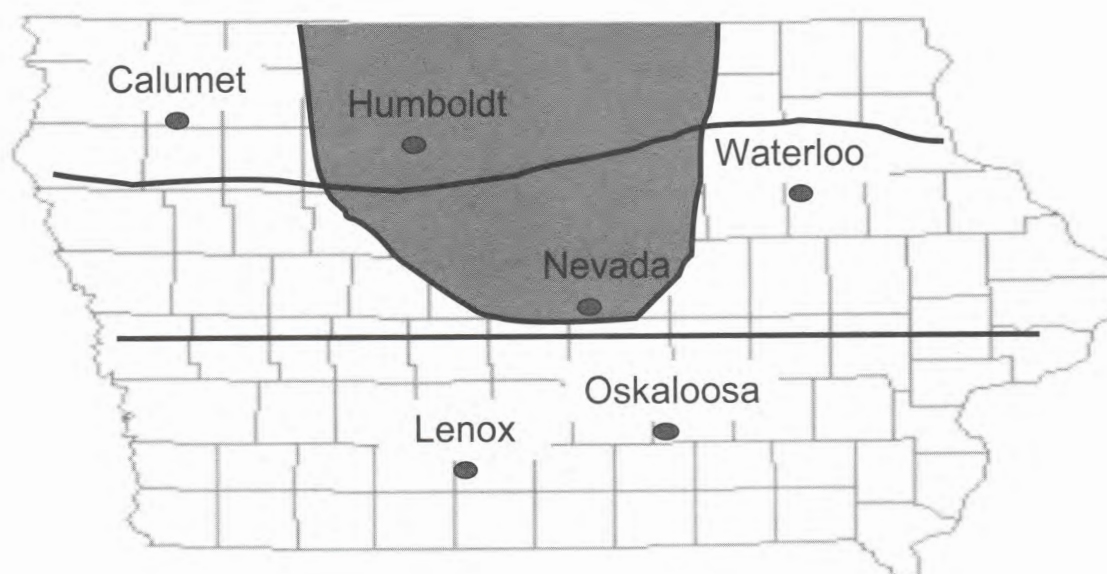


Figure. 1. The six no-tillage locations in Iowa with two locations in southern Iowa, two locations in central Iowa, and two locations in northern Iowa. Of the six locations, two locations are within the Des Moines Lobe.



Figure 2. One of four replications at the Oskaloosa location in 2008.

Strips of conventional tillage (chiseled in the fall and cultivated in the spring) are replicated and randomized with no-tillage strips. There are a total of seven different experiments to address the specific objectives. In this presentation, data from the 2007 and 2008 growing season will be presented and conclusions will be drawn based on the first two of this three year project.

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